Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1803	((73/30.01,30.02,30.03,30.04) or (73/149,232,262,861.08, 861.47,861.49)).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/11/16 13:44
L2	4	1 and "fuel cell"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/11/16 13:44
L3	394	"fuel cell" and ((fuel near3 level) with (sensing sensor monitor$4 detect$4 measur$4))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/11/16 13:46
S1	1773	((73/30.01,30.02,30.03,30.04) or (73/149,232,262,861.08, 861.47,861.49)).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/11/16 13:44
S2	2	S1 and (fuel adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 06:10
S3	70692	(fuel adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:30
S4	16326	S3 and (level quantity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 06:11
S5	142	S4 and ((level quantity) with gauge)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:45
S6	11	S1 and (collapsible)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 06:16
S7	139080	fuel adj (tank container supply)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:06
S8	1802	S7 and ((level quantity) with gauge)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 06:17
S9	564	S8 and (collaps$4 moveable moving)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 06:18

S10	746	S8 and (bag flexible collaps$4 moveable moving)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 06:02
S11	1	("6176260").URPN.	USPAT	OR	ON	2005/03/23 06:39
S12	5	("4709723" | "4780063" | "5482444" | "5596971" | "5979417").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/23 06:40
S13	11	("3617034" | "3701540" | "3949720" | "3977379" | "4579139" | "4951699" | "5056493" | "5596971" | "5722374" | "5746185" | "5746186").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/23 06:41
S14	39	("3617034").URPN.	USPAT	OR	ON	2005/03/23 06:42
S15	4	("4880135").URPN.	USPAT	OR	ON	2005/03/23 06:46
S16	5	("3617034" | "3693825" | "4163505" | "4254887" | "4705185").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/23 06:47
S17	8	("3886733").URPN.	USPAT	OR	ON	2005/03/23 07:55
S18	19	("1828784" | "2770097" | "2852916" | "3030780" | "3195620" | "3280555" | "3431742" | "3440829" | "3561210" | "3640083" | "R025065").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/23 07:57
S19	10	("2383840").URPN.	USPAT	OR	ON	2005/03/23 08:03
S20	0	("1446439").URPN.	USPAT	OR	ON	2005/03/23 08:07
S21	123	fuel adj (bladder)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 08:08
S22	405	fuel near4 (bladder)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 08:08
S23	28	("20030077491"|"20030091883"|"20030118881"|"20030129464"|"20030131663"|"20030134162"|"20030141188"|"20030150655"|"20030215681"|"6254748"|"6306285"|"6429242"|"6584825"|"6589679").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 09:11
S24	10304	S7 and (magnet magnetic)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:23
S25	184	S7 and ((magnet magnetic) with oscillat$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:07
S26	41	S1 and (magnet$4 with (level volume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:15
S27	1432	S7 and ((magnet magnetic) with (moving movable))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:23

S28	1432	S27 and fuel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:24
S29	42	S27 and (fuel adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:29
S30	1432	S4 and ((level quantity) with sensor)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:30
S31	321	S30 and (magnet$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:38
S32	6519	(magnet$4 near3 float)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:39
S33	3961	S32 and (level volume)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:40
S34	478	S33 and fuel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 10:40
S35	7	("3703246" | "4552090" | "4627283" | "4905377" | "5752409" | "5920255" | "5950487").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/23 10:47
S36	0	("6502461").URPN.	USPAT	OR	ON	2005/03/23 11:09
S37	0	(9proximity adj sensor)	USPAT	OR	ON	2005/03/23 11:09
S38	8200	(proximity adj sensor)	USPAT	OR	ON	2005/03/23 11:09
S39	453	S28 and (volume level)	USPAT	OR	ON	2005/03/23 11:09
S40	1801	inductance with (proximity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 12:54
S41	1065	S40 and (level or volume)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 12:55
S42	80	S40 and ((level or volume) with (fuel liquid water fluid))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:37
S43	12	("4422723").URPN.	USPAT	OR	ON	2005/03/23 13:00
S44	21	("4165641").URPN.	USPAT	OR	ON	2005/03/23 13:02

S45	1773	((73/30.01,30.02,30.03,30.04) or (73/149,232,262,861.08, 861.47,861.49)).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/07/23 11:02
S46	60	S45 and (induction inductance)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 13:09
S47	16414	(liquid fuel fluid water) with bladder	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 13:09
S48	9697	S47 and (level volume)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 13:09
S49	2768	S47 and ((measur$4 determin$4 detect$4 sens$4) with (level volume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 13:11
S50	365	S49 and (induction inducance inducting)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:57
S51	2	("5,455,508").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/03/23 13:36
S52	731	S49 and magnet$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 13:50
S53	495	S49 and magnet$4 not protein$2	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/23 13:50
S54	10745	(429/12-46).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/03/24 07:31
S55	4493	S54 and (volume)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 07:31
S56	959	S54 and ((measured measuring measure detect$4 determine deteriming determined "4" sensing sensor) with (volume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 07:33
S57	529	S54 and ((measured measuring measure detect$4 determine deteriming determined sensing sensor) with (volume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 07:33

S58	131	S54 and ((measured measuring measure detect$4 determine deteriming determined sensing sensor) with (volume) with fuel)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 09:01
S59	3	("5056493" | "5773162" | "6127057").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/24 07:57
S60	1	("6610433").URPN.	USPAT	OR	ON	2005/03/24 07:59
S61	8	("4771295" | "4791438" | "4794409" | "5010354" | "5969736" | "6041762" | "6447945" | "6610433").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/24 07:59
S62	388	S54 and ((measured measuring measure detect$4 determine deteriming determined sensing sensor) with (level) with fuel)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 09:01
S63	0	(WO-03009410-$).did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 09:32
S64	1	(WO-3009410-$).did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 09:49
S65	1	(livshits-va$).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 09:50
S66	4	(livshits-vl$).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 09:50
S67	3	(dual with bridge with accelerometer).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 13:15
S68	25	(fuel adj (level volume)) and (proximity adj switch)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 13:47
S69	42	(fuel adj (level volume)) and (proximity adj sensor)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/24 13:47
S70	1802	inductance with (proximity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:37
S71	55	S70 and ((level or volume) with (fuel liquid water fluid)) and coil	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:37
S72	21	("4165641").URPN.	USPAT	OR	ON	2005/03/25 05:41

| S73	70831	(fuel adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:45
S74	16417	S73 and (level quantity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:45
S75	37	S74 and ((level quantity) with gauge) and coil	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:45
S76	16458	(liquid fuel fluid water) with bladder	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:57
S77	2778	S76 and ((measur$4 determin$4 detect$4 sens$4) with (level volume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:57
S78	130	S77 and (induction inducance inducting) and coil	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 05:57
S79	0	(fuel near (levelvolume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 06:03
S80	23990	(fuel near (level volume))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 06:03
S81	369	S80 and (coil with core)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 06:03
S82	12	("0986210" | "2424766" | "2484690" | "2853878" | "3678748" | "3678750" | "3688187" | "4305285").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/25 06:35
S83	14	("3688187").URPN.	USPAT	OR	ON	2005/03/25 06:36
S84	2	(GB-2064125-$)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 07:10
S85	88	(rogers-da$).xa.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/03/25 09:39
S86	2	("6641240").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/07/22 12:53

S87	2	("5583545" | "5623290").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/07/22 13:14
S88	0	("6641240").URPN.	USPAT	OR	ON	2005/07/22 13:15
S89	14	("5623290").URPN.	USPAT	OR	ON	2005/07/22 13:15
S90	0	(oscilat$4 with magnetic with field) and ((fluid liquid water) near2 level)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 05:46
S91	198	(oscillat$4 with magnetic with field) and ((fluid liquid water) near2 level)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 08:29
S92	4	("3256738" | "5627380" | "5723870").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/07/23 05:53
S93	0	("6508118").URPN.	USPAT	OR	ON	2005/07/23 05:54
S94	758	(hall with (sensor gauge)) and ((fluid liquid water) near2 level)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 08:29
S95	110	(hall with (sensor gauge)) with ((fluid liquid water) near2 level)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 09:11
S96	2	("5,636,548").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/07/23 08:34
S97	49	("0347559" | "0699249" | "1155327" | "1746302" | "2691386" | "2928663" | "3044482" | "3467135" | "3470902" | "3658176" | "3837527" | "3983702" | "4187262" | "4203463" | "4235829" | "4313897" | "4341599" | "4353523" | "4580592" | "4582480" | "4589282" | "4859375" | "4964531" | "4979545" | "4979643" | "5016198" | "5038840" | "5176167" | "5279338" | "5440887" | "5518341" | "5606109" | "5636548" | "5866795" | "5880364" | "5921428" | "5938985" | "5972117" | "6019114" | "6067855").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/07/23 09:01
S98	0	("6588458").URPN.	USPAT	OR	ON	2005/07/23 09:05
S99	10	S95 and (hall and capacitance)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 09:14
S100	122	((liquid fuel) adj level) and (hall and capacitance)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 09:14
S101	7	((liquid fuel) adj level) and (hall with capacitance)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 09:15
S102	0	osillating with HALL with sensor	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 10:32

S103	28	oscillating with HALL with sensor	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 10:32
S104	1790	((73/30.01,30.02,30.03,30.04) or (73/149,232,262,861.08, 861.47,861.49)).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/07/23 11:02
S105	27	S104 and (remaining with fuel)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 11:03
S106	73	S104 and (bladder bag liner)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/23 11:03

TOSHIBA

Toshiba Announces World's First Small Form Factor Direct Methanol Fuel Cell for Portable PCs

5 March, 2003
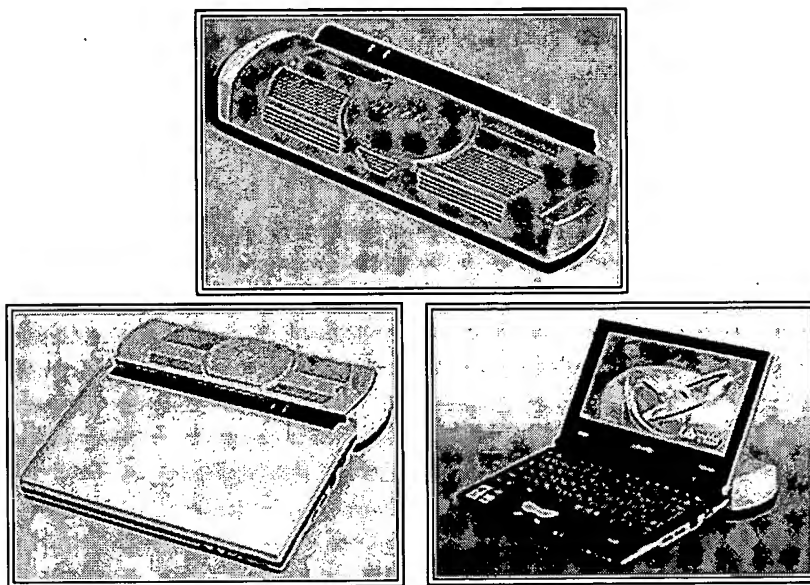
Tokyo--Toshiba Corporation today announced the world's first prototype of a small form factor direct methanol fuel cell (DMFC) for portable PCs, a clean energy breakthrough with the potential to end reliance on rechargeable batteries. The new fuel cell currently realizes average output of 12W and maximum output of 20W, and can achieve approximately five hours of operation with a single cartridge of fuel. It provides instant power supply, and achieves significant advances in operating times with replaceable methanol cartridges.

Toshiba will present the DMFC at CeBIT in Hannover, Germany from March 12 to 19.

The hardware capabilities of notebook PCs, cellular phones, PDAs and other portable devices continue to make rapid progress, However, faster CPUs, higher resolution displays, wireless connectivity and other advances all increase the demands on power supply and underline the limitations of current lithium-ion batteries.

Fuel cells are widely seen as a replacement for lithium-ion batteries, but companies working on their development have to overcome the problems of miniaturization and fuel delivery. Toshiba has achieved this with its DMFC.

Methanol in a fuel cell delivers power most efficiently when it is mixed with water in a 3 to 6% methanol concentration--a concentration requiring a fuel tank that is much too large for use with portable equipment. Toshiba overcame this by developing a system that allows a higher concentration of methanol to be diluted by the water produced as a by-product of the power generation process. This technology allows methanol to be stored at a much higher concentration, and achieves a fuel tank less than 1/10 the size of that required for storing the

same volume of methanol in a 3 to 6% concentration. The current prototype can operate for approximately five hours on 50cc of high concentration methanol.

Alongside this, Toshiba realized essential technologies for miniaturization of a high performance fuel cell. These include interface and electric circuits to assure efficient control of power supply; sensors to monitor methanol concentration and liquid level; and a remaining quantity sensor to tell users when they need to change the methanol fuel cartridge. All these components, and low power liquid and air transmission pumps, are controlled by a super small DC-DC converter.

For the cell itself, Toshiba developed a new material that allows smaller cells, allowing for miniaturization of the cell stacks.

One of Toshiba's main concerns in developing the DFMC was optimized operating efficiency, to assure that the fuel cell generates power at the required level, with minimal waste of energy. Towards this, the company investigated such factors as fuel density and circulation, and air supply levels, all in order to map the best operating conditions for a miniaturized fuel cell. In addition, the PC sends information on its operating status to the fuel cell in order to balance power demand and supply. Any unused energy is stored in the DMFC and can be drawn on when the PC requires extra power.

Toshiba has given the DMFC the same electrodes as found in lithium-ion batteries, allowing it to connect directly to a PC or other portable device in the same way as an lithium-ion battery. It can also be used as an alternative to lithium-ion batteries. The DMFC removes the need for proximity to a mains power supply to assure long operating times.

Toshiba will continue development of DFMC technology, with the aim of product commercialization within 2004. The current DMFC will be on display at Toshiba's booth at CeBIT, in Hall 1 6h2.

Main Specifications

Product	Methanol fuel cell directly connected to the PC
Output	Average 12W Maximum 20W
Voltage	11V
Size	275 x 75 x 40mm (825cc)
Weight	900g
Operating hours	Approximately five hours with 50cc, and 10 hours with 100cc, of high concentration methanol fuel
Cartridge weight	120g (100cc), 72g (50cc) (Approximate)
Cartridge size	100cc: 50 x 65 x 35mm 50cc: 33x 65 x35mm
Fuel	Methanol

Information in the press releases, including product prices and specifications, content of services and contact information, is current on the date of the press announcement,but is subject to change without prior notice.

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